JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1998, **31,** 679–682 NUMBER 4 (WINTER 1998)

EFFECTS OF WARNING STIMULI FOR REINFORCER WITHDRAWAL AND TASK ONSET ON SELF-INJURY

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Results of a functional analysis of self-injurious behavior (SIB) in a child with autism showed that her SIB was maintained by access to preferred objects and escape or avoidance of task demands. Extinction and noncontingent reinforcement treatments were supplemented by presenting a statement combined with a picture cue at 30-s intervals indicating that a preferred object would be removed or a task would be presented. Warning stimuli in combination with extinction and noncontingent reinforcement reduced SIB to acceptable levels. SIB rates remained comparatively high in a control condition consisting of a 2-min delay to onset of reinforcer removal or task demands.

DESCRIPTORS: self-injury, functional analysis in schools, warning stimuli, treatment supplement

When a preintervention functional analysis indicates that an individual's problem behavior is maintained by one or more reinforcement contingencies, various interventions are available to weaken the maintaining contingency. Among the most common intervention procedures for this purpose are extinction (EXT) and noncontingent reinforcement (NCR).

In this study, treatments consisting of EXT and NCR (access to preferred objects or escape from demands) were implemented but failed to reduce self-injurious behavior (SIB) to acceptable levels. Evidence that some individuals with autism exhibit higher rates of problem behavior when changes are less predictable gave rise to the hypothesis that warning stimuli indicating the pending onset of reinforcer removal or onset of academic tasks might further reduce rates of self-injury (Flannery & Horner, 1994; Tustin, 1995). The current investigation assessed an intervention package of EXT and NCR with and without warning stimuli.

This investigation was made possible by a Severe Handicap Training Grant for Lehigh University provided by the U.S. Department of Education.

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METHOD

Participant and Setting

Kerry was a 7-year-old girl who had been diagnosed with autism and moderate mental retardation. She required physical assistance in self-care skills such as dressing and grooming and communicated by using hand and body gestures. Kerry responded to simple statements combined with picture cards that signaled scheduled events at school. She was referred for evaluation and treatment of SIB, which had become increasingly unmanageable both at home and at school. All sessions were conducted in Kerry's special education classroom.

Dependent Measure and Data Collection

Self-injurious behavior was defined as head banging on a hard surface, striking a hand

or fist to the head, and hair pulling. Observers collected data on SIB using a count within 10-s interval recording system. Interobserver agreement was calculated on a point-by-point basis during 26% of the sessions, evenly distributed across phases. Mean occurrence agreement was 93% (range, 81% to 100%). Two to five 5- or 10-min sessions were conducted daily.

Procedure

The following experimental phases were presented in an ABAB′CB′ design, with a 10-month follow-up phase. Experimental conditions within each phase were arranged in a multielement design.

Functional analysis baseline (A). Descriptive assessment data indicated that Kerry's SIB was possibly maintained by escape from task demands and access to preferred items or activities. The validity of these hypotheses was tested under four analogue conditions (see Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). All conditions were randomized within the context of a multielement design. The experimental conditions were play, escape from demands, access to tangible items, and attention. Based on information from the descriptive assessment, escape or access in the demand, tangible, and attention conditions was provided contingent on the occurrence of SIB on a variable-ratio 2 schedule of reinforcement.

Treatment comparison (B). Treatment in the tangible and escape conditions consisted of EXT plus NCR (access to items or escape from demands) for 15 to 20 s on a fixed-time 60-s schedule. During each session, the number of NCR intervals ranged from four to eight. Extinction in the escape condition involved the continued presentation of a prompt hierarchy consisting of verbal, modeling, and physical prompts every 20 s. Noncontingent reinforcement was delivered once every 60 s when the experimenter stated, "Time to take a break," while simultaneously presenting a "break" card. After the 15- to 20-s break period, Kerry was told, "It's time to work," was shown a "work" card (a photo of her working), and was presented with the next prompt in the hierarchy.

In the tangible condition, extinction consisted of not providing access to the preferred item contingent on SIB. Noncontingent reinforcement was provided every 60 s by giving Kerry the preferred item that had been removed while stating "your turn." After the 15- to 20-s access period, Kerry was shown a cue card showing "share," was told, "It's my turn," and had the item removed from her proximity.

Treatment with warning stimuli in the tangible and escape conditions consisted of EXT and NCR as described above. In addition, prior to the start of each session, warning stimuli consisting of the presentation of a picture prompt ("work" card or a "share" card) combined with a warning statement ("time to do work" for the escape condition or "my turn" for the tangible condition) were presented simultaneously. Warning stimuli were presented once every 30 s, for a total of four presentations within 2 min prior to the onset of the session. No other interaction between the participant and experimenter occurred during the 2-min interval. These two treatment conditions were presented in a counterbalanced order across sessions.

Treatment (B′). This phase consisted of the treatment with warning stimuli described above.

Treatment component evaluation (C). The EXT plus NCR treatment described above was compared to a modification of the treatment with warning stimuli to assess whether effects in the latter condition were due to the repetition of warning stimuli or the passage of time. The modified treatment consisted of a single presentation of the warning stimulus 2 min before the start of the session

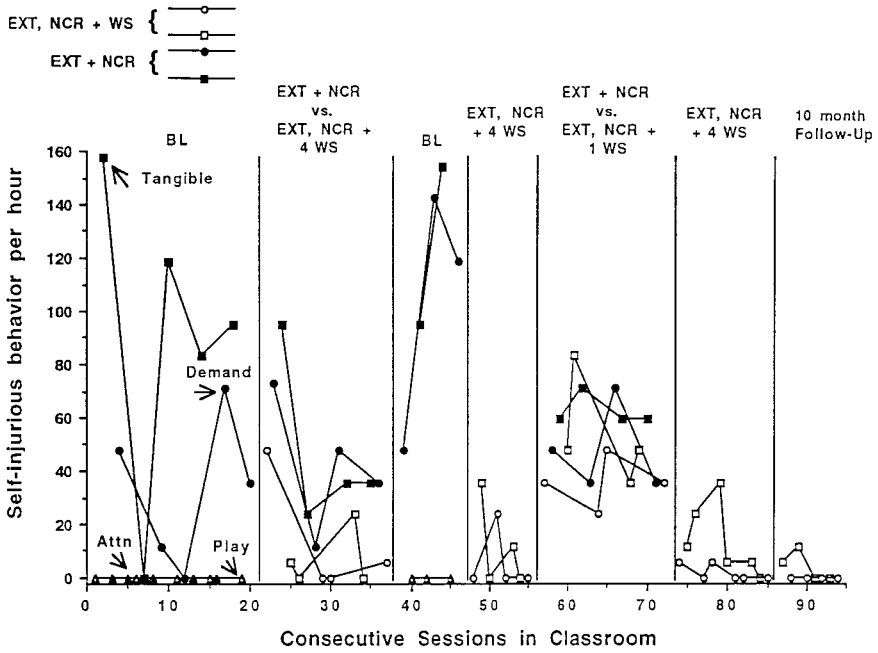

Figure 1. Self-injurious behavior per hour under the conditions of functional analysis baseline, extinction and noncontingent reinforcement (EXT + NCR) versus extinction, noncontingent reinforcement plus four warning stimuli (EXT, NCR + 4 WS), and extinction and noncontingent reinforcement (EXT + NCR) versus extinction, noncontingent reinforcement plus one warning stimulus (EXT, NCR + 1 WS).

(i.e., the onset of demands or the removal of the tangible item).

After the initial presentation of the warning stimulus, no participant–experimenter interactions occurred during the 2 min that preceded the start of the session.

The first five phases (ABAB′C) were conducted with the experimenter serving as the therapist. Prior to the start of the first B′ phase, the classroom teacher was trained to implement the interventions and observed all sessions conducted during that phase. The experimental conditions in the final B′ phase and the follow-up phase were identical to the first B′ phase, except that the sessions in these phases were conducted by the classroom teacher.

RESULTS AND DISCUSSION

Results of the functional analysis and treatment comparisons are presented in Figure 1. During the baseline functional analysis, Kerry's SIB occurred only when it resulted in escape from demands or access to restricted objects. Comparison of the EXT plus NCR treatment and the treatment with four warning stimuli showed that the addition of warning statements increased the effectiveness of treatment during both demand and tangible conditions. The effectiveness of the treatment was replicated in a subsequent baseline condition followed by a readministration of the treatment with four warning stimuli. In the fifth phase, the treatment with one warning stimulus was comparably effective to the EXT plus NCR treatment. A return to the treatment with four warning stimuli again increased the effectiveness of the treatment. This treatment continued to be effective 10 months later when implemented by the teacher.

The findings of this study suggest that when treatment involves exposure to aversive stimulation (e.g., task demands, reinforcer removal), the effectiveness of extinction and

noncontingent reinforcement can be enhanced by presenting repeated signals that warn of the pending onset of the aversive event.

Recent research has examined the effects of signaling changes in activities to individuals with severe disabilities and autism. Flannery and Horner (1994) examined the extent to which signaled and unsignaled events were associated with changes in level of problem behavior, and found that increased predictability was associated with reduced problem behavior. Tustin (1995) showed that stereotypy was reduced and that initiations of a second task were increased when advance notice of change was provided to the participant.

The effectiveness of the warning stimuli may be due to several factors that were not controlled in this study. It is possible that the 2-min delay after one warning controlled for the passage of time, but did not control for the temporal contiguity between the final warning stimuli and the demand or reinforcer removal. That is, it is possible that one warning delivered 30 s in advance (rather than 2 min) would have been as effective as the four warning stimuli. Thus, the timing of the final warning may be as important as repetition. Overall, a number of parameters determining the effectiveness of this intervention are not known, including the influence of intertrial delay, number and pace of warnings, latency between final warning and aversive stimulation, and influence of prior history with warning stimuli.

This article extends current research by examining the effects of advance notice versus number of prompts prior to initiation of task or reinforcer withdrawal. Whether the findings in this study are more probable with individuals with autism may be an important focus for future research.

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Received September 22, 1997
Initial editorial decision November 12, 1997
Final acceptance July 7, 1998
Action Editor, Cathleen C. Piazza